

Scheme of Work 2020 - 2021
Subject: Computer Science

Year Group: 11

Specification: AQA GCSE Computer Science

Lesson No	Topic & Objectives	Big Question – What will students learn?	Key Activities & Specialist Terminology (Do Now Task / Starter/Tasks/Plenary)	Planned Assessment	Homework or flipped learning resources DODDLE resources	Lit Num SMSC Codes
	Project released 1st September 2020.	Unsure until September	NEA Project – Students are required to complete a in class assessment – this document is completed in controlled conditions and must not leave or be discussed outside of the classroom	9th March to 20th March 2021	Units 2A and 2B to support NEA Project.	C1 C2 C3 Sp3 Sp4 Sp7
W.B. 3 rd Sept	Hardware and software	<p>Define the terms hardware and software and understand the relationship between them.</p> <p>Explain what is meant by systems software and application software and be able to give examples of them.</p> <p>Understand the need for and functions of the OS and utility programs.</p>	<p>This is very much a theory topic so is probably best delivered by the teacher talking and discussing with the class.</p> <p>For the first point, students simply need to know that hardware is that the electronic or electro-mechanical components of the computer and that software are the programs that run on the hardware and tell it what to do to perform a task.</p> <p>Students need to know that application software completes user-oriented tasks that the user would need to do with or without a computer whereas system software performs tasks related to the management of the computer system.</p>	<p>Purple book –End of Topic Assessment</p> <p>Asking appropriate questions in CATs</p> <p>Minute Paper</p>	<p>Iteration Homework</p> <p>Research on keywords and definitions</p> <p>Documented problem solutions</p> <p>senecalearning.com</p> <p>doddlelearn.co.uk</p>	C1 C2 C3 Sp3

			<p>Students need to know that the OS manages processor(s), memory, I/O devices, applications and security but do not need to know how.</p> <p>A utility is a program that helps manage a computer but is not core to its operation eg a compression program, a virus-checker. It might be useful to make students aware that utilities are increasingly being bundled with the OS.</p>			
W.B. 7 th Sept	Networks	<p>Students should be able to explain what a computer network is, discuss risks and benefits of networks and the relative merits of wired and wireless networking</p> <p>Students can describe LAN, WAN and PAN and understand star and bus topologies, including their relative merits</p>	<p>Students will have direct experience of using networks, both wired and wireless, so this makes a good discussion topic – pros and cons of having a network and also of wired vs wireless networks.</p> <p>Differences between LAN and WAN should be considered in terms of size, ownership and the hardware used.</p> <p>Topologies are best visualised; it is worth noting that physical bus networks have limited applications nowadays.</p> <p>This topic can be taught as a discussion or there are many online videos and resources.</p>	<p>Purple book –End of Topic Assessment</p> <p>Asking appropriate questions in CATs</p> <p>Minute Paper</p>	<p>senecalearning.com</p> <p>Research on: -Video showing use of MAC address whitelist -Very short video on firewalls</p> <p>Iteration Homework</p> <p>Documented problem solutions</p> <p>doddlelearn.co.uk</p>	<p>C1 C2 C3 Sp3 Sp4 Sp7</p>
W.B. 14 th Sept	Protocols	<p>Define the term ‘network protocol’.</p> <p>Explain the purpose and use of common network protocols including: Ethernet, Wi-Fi, TCP, UDP, IP, HTTP, HTTPS, FTP, SMTP, IMAP.</p>	<p>This topic is a fairly theoretical one. Students could use textbooks, online notes or videos to learn from.</p> <p>They need to understand why a stack is used (abstraction), what the four layers are and some functions of each layer of the stack and at which layers the listed protocols work.</p>	<p>Purple book –End of Topic Assessment</p> <p>Asking appropriate questions in CATs</p> <p>Minute Paper</p>	<p>senecalearning.com</p> <p>doddlelearn.co.uk</p>	<p>C1 Sp2 Sp3</p>

		<p>Understand the need for, and importance of, network security.</p> <p>Explain the following methods of network security: authentication, encryption, firewall, MAC address filtering.</p>				
W.B. 21 th Sept	TCP Layers	Students should know what the four layers are and some functions of each layer, together with which of the protocols listed operate at which layer.	<p>This topic is a fairly theoretical one. Students could use textbooks, online notes or videos to learn from.</p> <p>They need to understand why a stack is used (abstraction), what the four layers are and some functions of each layer of the stack and at which layers the listed protocols work.</p>	<p>Purple book –End of Topic Assessment</p> <p>Asking appropriate questions in CATs</p> <p>Minute Paper</p>	<p>Video tutorial - Youtube senecalearning.com</p> <p>doddlelearn.co.uk</p>	<p>C1 C2 C3 Sp3</p>
W.B. 28 th Sept	Cyber Security	Be able to explain cyber security and the cyber security threats covered by the specification.	<p>This topic works well as a class discussion as most students will be familiar with some of these topics from their own personal experiences.</p> <p>Students could make a presentation, each focusing on one or more topics.</p>	<p>Purple book –End of Topic Assessment</p> <p>Asking appropriate questions in CATs</p> <p>Minute Paper</p>	<p>Documentary on cybercrime in the UK</p> <p>Five of the worst computer viruses</p> <p>Notes on some topics of computer security senecalearning.com</p> <p>doddlelearn.co.uk</p>	<p>M8 C1 C2 C3 Sp3</p>

W.B. 5 th Oct	Protection	Be able to describe methods that are suitable for protecting from cyber security threats	This topic works well as a discussion, as students will be aware of some of these topics from their own experiences. They may need to be focused somewhat to ensure that they cover all of the topics on the specification.	Purple book –End of Topic Assessment Asking appropriate questions in CATs Minute Paper	Novalabs cyber security protection game senecalearning.com Cyber security threats and solutions doddlelearn.co.uk	M8 C1 C2 C3 Sp3 Sp4 Sp7
W.B. 12 th Oct	Security Measures	<p>Students understand what hacking is, what the dangers of hacking are and how cyber security measures can be used to prevent it.</p> <p>Students understand what cloud storage is and its advantage and disadvantages in comparison to local storage.</p> <p>Students understand that cracking can be used as an alternative name for hacking or to mean breaking copy protection of software.</p>	<p>Students should consider what hacking is and the motivation for it. A look at some simple hacking techniques might be of interest but is not required.</p> <p>This topic should be linked into cyber security and the measures that can be taken to prevent hacking.</p> <p>The issue of hacking by governments and whether this can be justified and under what circumstances could also be looked at.</p> <p>The advantages and disadvantages of cloud storage should be considered. This would probably be best achieved in the context of a real cloud service that students' might have used. Examples of security breaches of such services could be examined.</p> <p>Cyber security methods are considered in greater detail in specification section 3.6.</p> <p>This topic could be tackled by students doing individual research and then having a class discussion.</p>	Purple book –End of Topic Assessment Asking appropriate questions in CATs Minute Paper	<p>Novalabs cyber security protection game</p> <p>Cyber security threats and solutions</p> <ul style="list-style-type: none"> • 5 most dangerous hackers of all time • 10 biggest computer hacks of all time • Hacking a car with an ex-NSA hacker <p>Cloud storage senecalearning.com</p>	M8 C1 C2 C3 Sp3

					doddlelearn.co.uk	
W.B. 19 th Oct	Mobile Technology	Students should understand the risks and benefits of wireless and mobile technologies.	<p>Students should consider the risks and benefits of wireless networking, including ease of access to the Internet and possible security risks.</p> <p>Mobile technologies are facilitating many new applications of computing and also making access to the Internet more widely available.</p> <p>Some of this content may have already been covered as part of specification section 3.5.</p> <p>This topic would be suitable for students to do individual research on and then have a class discussion about.</p>	<p>Purple book –End of Topic Assessment</p> <p>Asking appropriate questions in CATs</p> <p>Minute Paper</p>	<ul style="list-style-type: none"> • 5 most dangerous hackers of all time • 10 biggest computer hacks of all time • Hacking a car with an ex-NSA hacker <p>Cloud storage</p>	M8 C1 C2 C3 Sp3 Sp9
W.B. 2 th Oct	Data types	<p>Understand the concept of data type</p> <p>Apply the listed programming techniques.</p> <p>Choose appropriate data types.</p>	<p>Understand and use the following appropriately:</p> <ul style="list-style-type: none"> • integer • real • Boolean • character • string 	<p>Class activities/exercises – Green book</p> <p>Asking appropriate questions in CATs</p> <p>Asking appropriate questions in CATs</p> <p>Minute Paper</p>	<p>Online activities - Doodle Learning</p> <p>Research on keywords and definitions</p> <p>Sequence and Selection Homework</p> <p>Notes on variables and data types (and some</p>	Sp2 Sp3

		<p>Use meaningful identifier names and know why.</p> <p>Understand what an algorithm is and the difference between an algorithm and program</p>			<p>other concepts not required until later)</p> <p>senecalearning.com</p> <p>doddlelearn.co.uk</p>	
<p>W.B. 2th Nov</p>	<p>Programming basic</p>	<p>Understand and use string, integer and real data types appropriately.</p> <p>Understand how variable declaration and assignment can be used in programs.</p> <p>Be able to use addition, subtraction, multiplication and real division.</p> <p>Be able to perform input and output.</p>	<p>Students should be introduced to basic input and output commands, declaring variables (if required by language), and using arithmetic operations.</p> <p>Students will also need to be taught basic aspects of the IDE for their programming language e.g. how to run a program, how to load/save, how error messages are presented and what they mean.</p> <p>Students should be introduced to the idea of an algorithm and that a program is an implementation of an algorithm.</p>	<p>Purple book –End of Topic Assessment</p> <p>Class activities/exercises – Green book</p> <p>Asking appropriate questions in CATs</p>	<p>2A L1 Programming Data Homework</p> <p>Employment of PRIMM (Predict, Run, Investigate, Modify and Make)</p> <p>Research on keywords and definitions</p> <p>Muddiest point</p> <p>Documented problem solutions</p> <p>Directed paraphrasing</p> <p>Classroom opinion polls</p> <p>senecalearning.com</p>	<p>C1 C2 C3 Sp3 Sp5</p>

<p>W.B. 9th Nov</p>	<p>Using Python</p>	<p>Use meaningful identifier names and know why it is important to use them.</p> <p>Understand and explain the term algorithm.</p>	<p>Getting the computer to display “Hello World” getting the user to type in their name and outputting hello to them (possibly concatenating forename and surname input separately)</p> <p>Doing simple calculations, for example adding three numbers, multiplying two numbers together doing more complex calculations, for example area of a rectangle, area of a triangle, area of a circle, area of a trapezium.</p>	<p>Purple book –End of Topic Assessment</p> <p>Class activities/exercises – Green book</p> <p>Asking appropriate questions in CATs</p>	<p>Programming tasks/ mini assignment</p> <p>Employment of PRIMM (Predict, Run, Investigate, Modify and Make)</p> <p>Research on keywords and definitions</p> <p>Muddiest point</p> <p>Documented problem solutions</p> <p>Directed paraphrasing</p> <p>Classroom opinion polls</p> <p>doddlelearn.co.uk</p>	<p>C1 C2 C3 C5 Sp9</p>
<p>W.B. 16th Nov</p>	<p>Boolean Operators</p>	<p>Be able to use selection (if, else, else if, case/switch if appropriate)</p> <p>Be able to use a range of relational operators.</p> <p>Be familiar with and able to use NOT, AND, OR.</p>	<p>The focus in this section is on the use of selection statements to determine the path of code execution. Exercises should build in difficulty, starting with simple Yes/No answers using just an If statement then building in complexity in terms of the number of possible outcomes and the complexity of the criteria used.</p>	<p>Purple book –End of Topic Assessment</p> <p>Class activities/exercises – Green book</p> <p>Asking appropriate questions in CATs</p>	<p>2A I2 Sequence and Selection Homework</p> <p>Online activities - Doodle Learning</p> <p>Research on keywords and definitions</p> <p>Muddiest point</p> <p>Documented problem solutions</p>	<p>C1 C2 C3 Sp3 Sp5</p>

		<p>Using nested selection structures.</p> <p>Be able to select suitable test data that covers normal (typical), boundary and erroneous data. Be able to justify the choice of test data.</p> <p>Be able to understand pseudo-code and flowcharts.</p>	<p>Pseudo-code and flowcharts could be used to illustrate some algorithms which students could then write program code for.</p> <p>Whilst completing these exercises, consideration should be given to choosing test data, which is particularly important in boundary situations of which there are many in these exercises.</p> <p>Exercises could include:</p> <ul style="list-style-type: none"> • exam mark pass/fail • determining if a person is a child/adult/pensioner based on their age • allocating an exam grade based on mark ranges • identifying the biggest of two or three numbers • Identifying if a triangle is scalene, isosceles or equilateral • classifying the temperature based on a range e.g. 0 or below = freezing, above 0 but 10 or below = warm. 		<p>Directed paraphrasing</p> <p>Classroom opinion polls</p> <p>doddelearn.co.uk</p>	
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<p>WB 23th Nov</p>	<p>Iteration</p>	<p>Be able to use definite iteration.</p> <p>Be able to use nested iteration.</p>	<p>Students should be introduced to the concept of definite iteration and a loop counter. Pseudo-code and flowcharts could be used to illustrate algorithms.</p> <p>Exercises could include:</p> <ul style="list-style-type: none"> • counting from one to ten • displaying a times table, or all times tables • adding up five numbers (average the same numbers and identify the highest and lowest) • Working out factors of a number using brute-force approach – identifying prime numbers using brute-force approach. 	<p>Paper 1 mini assessment</p> <p>Purple book –End of Topic Assessment</p> <p>Class activities/exercises – Green book</p> <p>Asking appropriate questions in CATs</p>	<p>2A L3 Iteration Homework</p> <p>Research on keywords and definitions</p> <p>Muddiest point</p> <p>Documented problem solutions</p> <p>Directed paraphrasing</p> <p>Classroom opinion polls</p>	<p>C1 C2 C3 Sp3 Sp5</p>
<p>W.B. 30th Nov</p>	<p>Looping</p>	<p>Be able to use indefinite iteration with conditions at start and end of loop.</p> <p>Be able to use random number generation.</p> <p>Be able to use some string handling techniques.</p>	<p>Students need to be taught about indefinite iteration and how to use this in their programming language. For students using Python which does not have a post-conditioned loop, they should be taught how to implement post-conditioned loops as equivalent pre-conditioned loops.</p>	<p>Purple book –End of Topic Assessment</p> <p>Class activities/exercises – Green book</p> <p>Asking appropriate questions in CATs</p>	<p>Research on keywords and definitions</p> <p>Muddiest point</p> <p>Documented problem solutions</p> <p>Directed paraphrasing</p> <p>Classroom opinion polls</p>	<p>C1 C2 C3 Sp3</p>

		<p>Be able to write simple data validation routines.</p> <p>Be able to write simple authentication routines.</p> <p>Understand and explain the term abstraction.</p>	<p>Students also need to know how to express these types of loop as pseudo-code and flowcharts.</p> <p>As students are now starting to tackle more complex problems, the concept of abstraction, i.e. removing unnecessary details from a problem, could be introduced at this point.</p> <p>Exercises could include:</p> <ul style="list-style-type: none">• performing simple validation e.g. that a typed value falls within a range or that an entered value cannot be left blank or is shorter than a minimum length• adding up a sequence of numbers of unknown length• asking users to enter a password until the correct password is entered, displaying suitable messages• guessing randomly chosen number until they guess correctly, with clues given about whether guess is too high/low			
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			<ul style="list-style-type: none"> Rolling two dice until a double six is scored, counting how many goes this takes. <p>Throwing darts and getting a random score on board (game starts at a total and plays with the total decreased by each dart thrown until 0 is achieved).</p>			
WB 7 TH Dec	Arrays	<p>Understand the concept of data structures.</p> <p>Use one-dimensional arrays (or equivalent) in the design of solutions to simple problems.</p> <p>Understand that more than one algorithm can be used to solve the same problem.</p> <p>Compare the efficiency of algorithms.</p> <p>Understand and explain how linear and binary search algorithms work and compare them.</p> <p>Understand and explain how bubble and merge sort</p>	<ul style="list-style-type: none"> inputting a list of names (or other data) and redisplaying them inputting a list of parcel weights (total the weights and work out the average, lowest and highest weight) searching a dictionary to check whether a word is in it using the linear search method improving the dictionary program to use the binary search method using the bubble sort algorithm to sort data (e.g. names) in an array looking theoretically at how the merge sort algorithm would perform the same sort (implementing merge sort is 	<p>Purple book –End of Topic Assessment</p> <p>Class activities/exercises – Green book</p> <p>Asking appropriate questions in CATs</p>	<p>2A L4 Arrays Homework</p> <p>Research on keywords and definitions</p> <p>Muddiest point</p> <p>Documented problem solutions</p> <p>Directed paraphrasing</p> <p>Classroom opinion polls</p>	<p>C1</p> <p>C2</p> <p>C3</p> <p>Sp3</p>

		<p>algorithms work and compare them.</p> <p>Use trace tables.</p>	<p>beyond GCSE but more able students could attempt this)</p> <ul style="list-style-type: none"> comparing the efficiency of the search and sort algorithms <p>Representing a game of snakes and ladders using a one-dimensional array to indicate the positions of snakes and ladders.</p>			
WB 14 TH Dec	Think like a computer!	<p>Understand and explain the term decomposition.</p> <p>Describe the structured approach to programming.</p> <p>Explain the advantages of the structured approach.</p> <p>Understand the concept of subroutines and be able to use them in programs, including the use of local variables.</p> <p>Explain the advantages of using subroutines in programs.</p> <p>Integer division, including remainders.</p>	<p>Students should be taught about why, when writing longer programs, it is useful to decompose them, and the facilities in their programming language to do this. They should also cover the difference between local and global variables. At this stage, parameters and return values can be ignored.</p> <p>Exercises could include:</p> <ul style="list-style-type: none"> making a maths toolkit, with a menu that is used to call different subroutines to work out (for example) the area of different shapes making a program that will allow conversion of numbers between different number bases, with different functions being used for 	<p>Purple book –End of Topic Assessment</p> <p>Class activities/exercises – Green book</p> <p>Asking appropriate questions in CATs</p>	<p>Research on keywords and definitions</p> <p>Muddiest point</p> <p>Documented problem solutions</p> <p>Directed paraphrasing</p> <p>Classroom opinion polls</p> <p>doddlelearn.co.uk</p>	<p>C1</p> <p>C2</p> <p>C3</p> <p>C4</p> <p>Sp3</p>

			<p>different conversions e.g. binary to decimal</p> <p>In all subsequent programs, students should be encouraged to consider how the programs can be decomposed into functions.</p>			
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